AN 08-30ARW10-2

HANDBOOK OF OPERATING INSTRUCTIONS

for

RADIO SET AN/ARW-10

RESTRICTED

(For Official Use Only)

Approved 11 December 1944

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SAFETY NOTICE

This equipment employs high voltages which are dangerous and may be fatal if contacted by operating personnel. Extreme caution should be exercised when working with the equipment.

Destruction of Abandoned Materiel in the Combat Zone

In case it should become necessary to prevent the capture of this equipment and when ordered to do so, DESTROY IT SO THAT NO PART OF IT CAN BE SALVAGED, RECOGNIZED, OR USED BY THE ENEMY. BURN ALL PAPERS AND BOOKS.

Means:—

1. Explosives, when provided.
2. Hammers, axes, sledges, machetes, or whatever heavy object is readily available.
3. Burning by means of incendiaries such as gasoline, oil, paper, or wood.
4. Grenades and shots from available arms.
5. Burying all debris or disposing of it in streams or other bodies of water, where possible and when time permits.

Procedure:—

1. Obliterate all identifying marks. Destroy nameplates and circuit labels.
2. Demolish all panels, castings, switch- and instrument-boards.
3. Destroy all controls, switches, relays, connections, and meters.
4. Rip out all wiring and cut interconnections of electrical equipment. Smash gas, oil, and water-cooling systems in gas-engine generators, etc.
5. Smash every electrical or mechanical part, whether rotating, moving, or fixed.
6. Break up all operating instruments such as keys, phones, microphones, etc.
7. Destroy all classes of carrying cases, straps, containers, etc.
8. Bury or scatter all debris.

DESTROY EVERYTHING!

★

Unsatisfactory Report

For U. S. Army Air Force Personnel:

In the event of malfunctioning, unsatisfactory design, or unsatisfactory installation of any of the component units of this equipment, or if the material contained in this book is considered inadequate or erroneous, an Unsatisfactory Report, AAF Form No. 54, or a report in similar form, shall be submitted in accordance with the provisions of Army Air Force Regulation No. 15-54, listing:

1. Station and organization.
2. Nameplate data (type number or complete nomenclature if nameplate is not attached to the equipment).
3. Date and nature of failure.
4. Radio model and serial number.
5. Remedy used or proposed to prevent recurrence.
6. Handbook errors or inadequacies, if applicable.

For U. S. Navy Personnel:

Report of failure of any part of this equipment during its guaranteed life shall be made on Form N. Aer. 4112, "Report of Unsatisfactory or Defective Material," or a report in similar form, and forwarded in accordance with the latest instructions of the Bureau of Aeronautics. In addition to other distribution required, one copy shall be furnished to the inspector of Naval Materiel (location to be specified) and the Bureau of Ships. Such reports of failure shall include:

1. Reporting activity.
2. Nameplate data.
3. Date placed in service.
4. Part which failed.
5. Nature and cause of failure.
6. Replacement needed (yes—no).
7. Remedy used or proposed to prevent recurrence.

For British Personnel:

Form 1022 procedure shall be used when reporting failure of radio equipment.

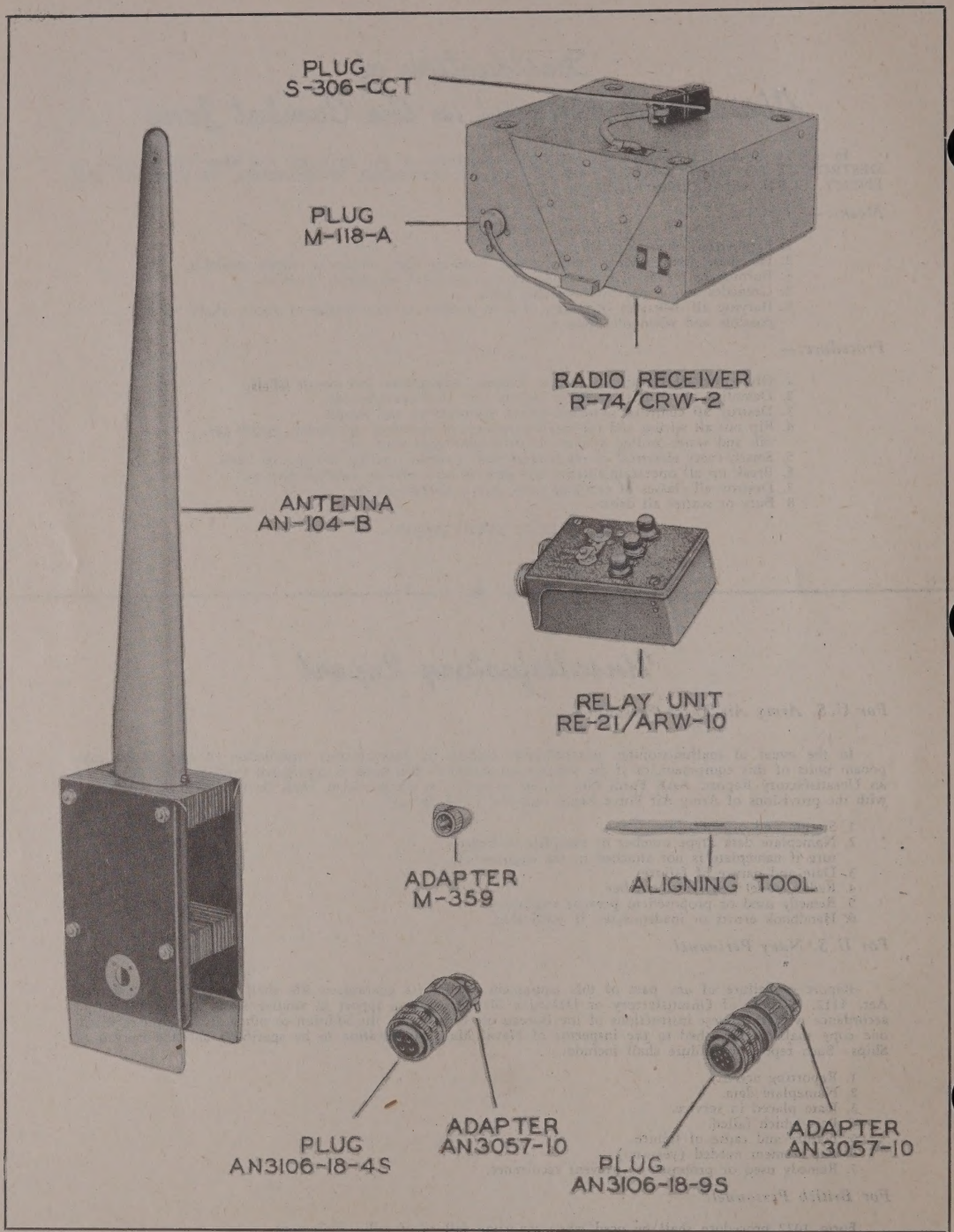


Figure 1-1. Radio Set AN/ARW-10—Composite

FOREWORD

This handbook may be supplemented in the near future with additional information.

SECTION I

GENERAL DESCRIPTION

1. GENERAL.

(See figure 1-1.)

a. Radio Set AN/ARW-10 is airborne equipment which comprises the receiving part of a remotely-controlled radio system. It is used in connection with Radio Set AN/ARW-9 and associated equipment.

b. Radio Set AN/ARW-10 consists of a six-tube receiver preset for operation in a specific frequency band.

c. The receiving equipment contains two sets of plug-in units, an r-f unit and a detector unit, each of which is tuned to one of five frequencies within the band.

(1) Tabs in accordance with the color codes listed in section V, paragraph 1 are attached to the front panel of each receiver.

(See figs. 1-2 and 1-3).

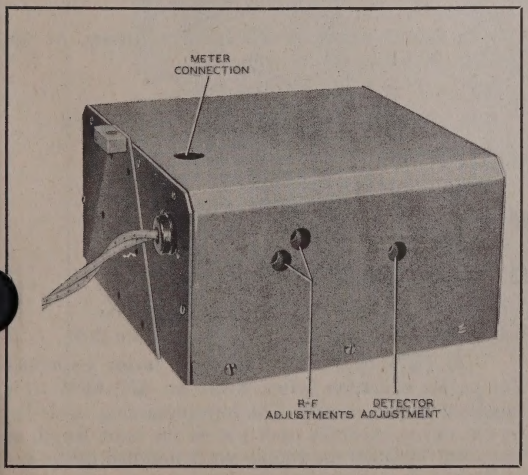


Figure 1-2. Radio Receiver R-74/CRN—Top View

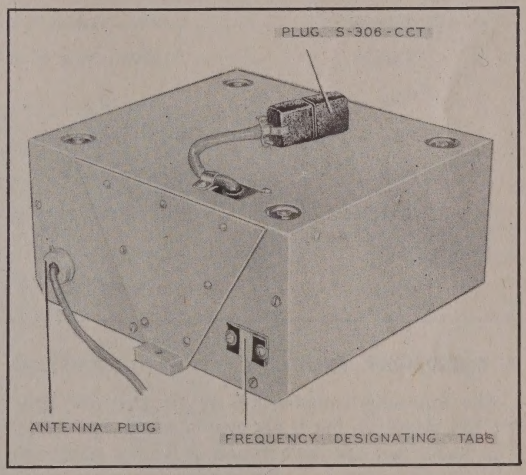


Figure 1-3. Radio Receiver R-74/CRW-2—Bottom View

(2) There are five of these tabs placed on top of each other with only the outside tab being visible. The receiver is aligned at the factory to a specific frequency in one range. The color tab identifying this frequency is placed on top of the other frequency-designating tabs.

d. Power for the operation of this equipment is obtained from the power system of the aircraft. It draws 3.0 amperes at 24 volts d-c. This input voltage operates a dynamotor in the receiver which has an output of 240 volts direct current. (See fig. 2-2).

2. EQUIPMENT SUPPLIED.

The following equipment is supplied with Radio Set AN/ARW-10.

Quantity	*Name of Unit*	*Army Type Designation*	*Navy Type Designation*	*Overall Dimensions (inches)*	*Weight (pounds)*
1	Radio Receiver, including:	R-74/CRW-2		9½ x 8$\frac{1}{16}$ x 4$\frac{7}{16}$	
1	Tuning Unit	TN-43/CRW-2			
1	Tuning Unit	TN-44/CRW-2			
1	Dynamotor (modified)	DM-42-A			
1	Aligning Tool				
1	Set of Tubes				
1	Plug	Type S-306-CCT			
1	Plug	Cinch No. M-118-A			
1	Relay Unit	RE-21/ARW-10		3$\frac{7}{8}$ x 5$\frac{1}{8}$ x 2$\frac{3}{16}$	
3	Lamps	LM-49			
1	Adapter	M-359			
1	Antenna	AN-104-A or B			
2	Adapter	AN3057-10	AN3057-10		
1	Plug	PL-259			
1	Plug	AN3106-18-4S	AN3106-18-4S		
1	Plug	AN3106-18-9S	AN3106-18-9S		
1	Receptacle	AN3100-20-1P (104)	AN3100-20-1P (104)		
1	Plug	AN3106-20-1S	AN3106-20-1S		
2	Adapter	AN3057-12	AN3057-12		

3. EQUIPMENT REQUIRED BUT NOT SUPPLIED.

The following equipment is required to test Radio Set AN/ARW-10, but is not supplied:

a. Radio Set AN/ARW-9 and associated equipment.

b. A 0-20 milliammeter, or the meter on Test Set I-56, I-56-H, I-56-J, or I-77-( ).

c. General Radio Signal Generator 804-B or equal.

d. Jackson Audio Oscillator 652 or equal.

e. Frequency Meter TS-174/U.

f. Test Box TS-154/CRW-2.

g. A power source consisting of a battery, or the equivalent, to supply 24 volts d-c.

h. One Plug PL-55.

i. Shielded Wire for Antenna Cable (AN-20).

SECTION II

INSTALLATION AND ADJUSTMENT

1. INSTALLATION.

a. PRELIMINARY.

(1) UNPACKING.—Use care in unpacking the equipment so that nothing is damaged. Then give the equipment a visual check to make sure that everything is in good order. Check against the list in section I, paragraph 2 to make sure that all parts are there.

(2) BENCH TEST.—Check the major assemblies for proper operation before Radio Set AN/ARW-10 is installed in the aircraft. The interconnecting cords between the components need not be the same length as they will be when the equipment is installed in the aircraft.

The following procedure should be followed to check the equipment.

(a) Setting General Radio Signal Generator 804-B on frequency.

1. Measure the frequency of Radio Set AN/-ARW-9 that is to be used with Frequency Meter TS-174/U.

2. Connect one end of Cord CX-131/CRW-2 (Part of Test Box TS-154/CRW-2) to the 24 volt d-c power source, and the other end to Test Box TS-154/-CRW-2 (see fig. 2-1).

3. Connect Receiver R-74/CRW-2 to the other cord of Test Box TS-154/CRW-2.

4. Plug the jack end of Cord CX-130/CRW-2 (part of Test Box TS-154/CRW-2) into the meter jack on the receiver (see figs. 1-2 and 2-2) and the other end of Cord CX-130/CRW-2 to the milliammeter.

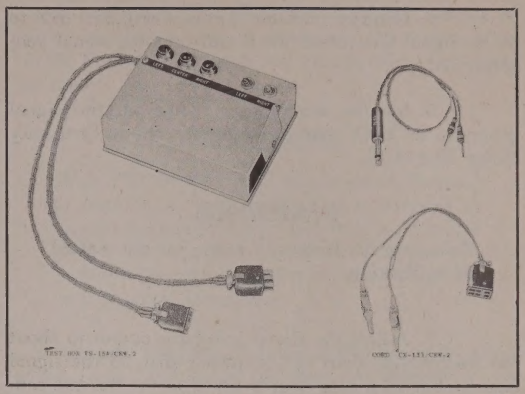


Figure 2-1. Test Box TS-154/CRW-2— Top View with Cords

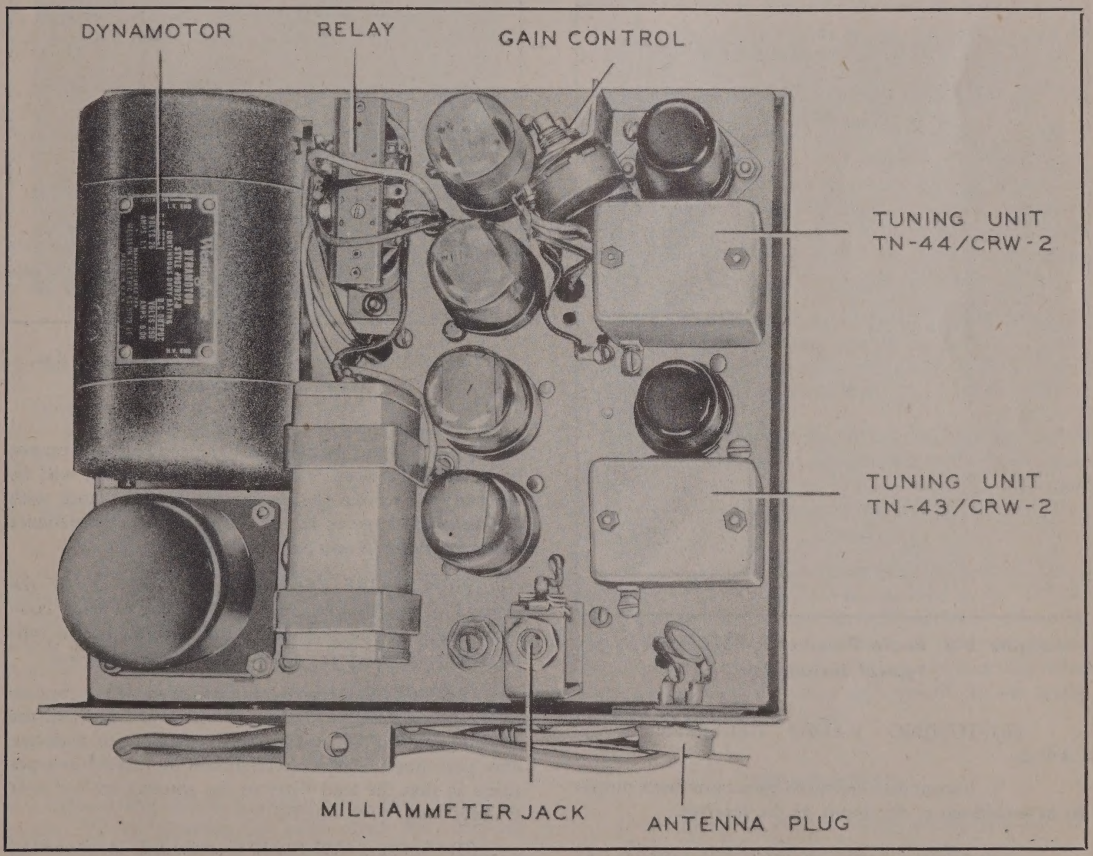


Figure 2-2. Radio Receiver R-74/CRW-2— Inside View

5. Connect Jackson Audio Oscillator 652 to G. R. Signal Generator 804-B and turn the signal generator on.

6. Set the modulation switch on the signal generator to "OFF" and connect it directly to Frequency Meter TS-174/U.

WARNING

Make sure the frequency meter has not drifted off calibration.

7. Adjust the signal generator output to about 200 microvolts. Turn the frequency dial on the signal generator until a zero beat is heard in the headset connected to Frequency Meter TS-174/U.

8. The signal generator is now on the same frequency as Radio Set AN/ARW-9. However, it may drift and will need recalibration every 4 or 5 hours.

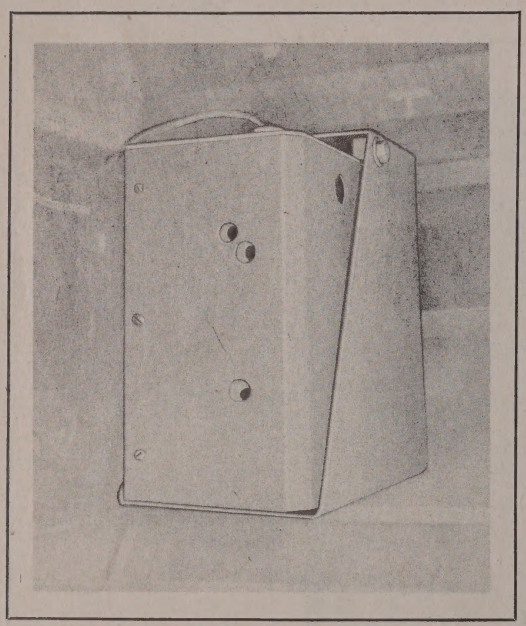


Figure 2-3. Radio Receiver R-74/CRW-2—Typical Installation

(b) TUNING RADIO RECEIVER R-74/-CRW-2.

1. Reconnect the signal generator with output set at maximum to the input of the receiver.

2. Adjust the detector adjustment (see fig. 1-2) with the aligning tool supplied (see fig. 1-1) until either the orange "RIGHT" or "LEFT" light on Test Box TS-154/CRW-2 will light and the meter gives a maximum current reading.

3. Tune the r-f adjustments (see fig. 1-2) just as in the preceding paragraph for maximum current reading on the meter.

4. Reduce the output of the signal generator until the lights of the test box just barely switch. Repeat the tuning procedure in section II, paragraph 1 *(b)* 2 and 3.

5. When the receiver will just operate at an output between 50 and 100 microvolts, it is properly tuned.

(c) SETTING THE SENSITIVITY CONTROL.

1. If the receiver is not sensitive enough, or too sensitive, it will be necessary to remove the cover and adjust the gain control (see fig. 2-2.).

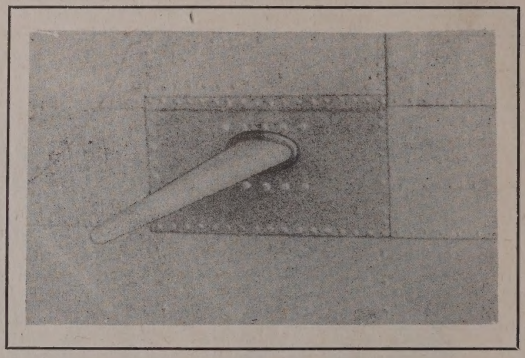


Figure 2-4. Antenna AN-104-A or AN-104-B—Typical Installation

2. If the sensitivity of the receiver still cannot be adjusted between 50 and 100 microvolts, it will be necessary to service the equipment in accordance with the instructions given in the *Handbook of Maintenance Instructions for Radio Set AN/ARW-10.*

b. PROCEDURE.—Specific instructions as to the method of installation and the location of each component will not be given since this depends on the type of aircraft in which the equipment is to be installed.

(1) Radio Receiver R-74/CRW-2 should be mounted in such a manner that the meter connection and the r-f and detector adjustments are accessible to *maintenance* personnel. The receiver should be located in a position so that the lead wires to the antenna are not over six feet long. (See fig. 2-3.)

(2) Antenna AN-104-B is mounted in a vertical position on the top of the fuselage of the aircraft. (See

fig. 2-4). A shielded wire, (or twisted pair) not to exceed six feet in length, should connect the antenna and the receiver. (See fig. 5-2.)

(3) Relay Unit RE-21/ARW-10 should be mounted on the left wall of the fuselage in the compartment of the operator of this equipment. It should be located where the lights and controls are both visible and within reach of the operator. (See fig. 2-5.)

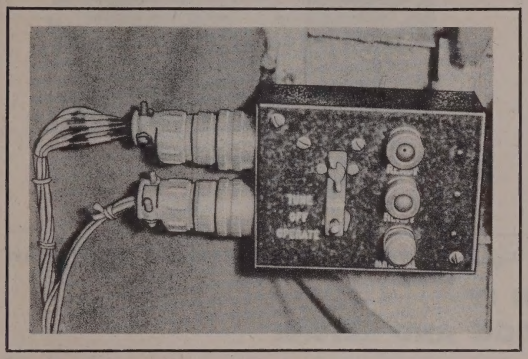


Figure 2-5. Relay Unit RE-21/ARW-10— Typical Installation

c. CABLE CONNECTIONS.

(1) See figure 5-2 for making up and connecting the interconnecting cables (open wiring) which are attached by means of AN type plugs.

(2) Screw all plugs tightly into their receptacles.

2. ADJUSTMENTS.

Operating personnel are cautioned to use extreme care in making any adjustments recommended in paragraph 1a (2) this section or paragraph 3 following.

3. AFTER-INSTALLATION TEST.

a. This test can best be carried out if the components of Radio Set AN/ARW-9 used are placed in a mobile vehicle along with some power provision. This should be carried on about 25 feet from the receiver antenna. Radio Modulator and Transmitter BC-1156 should have a dummy antenna, Antenna A-85-A or equivalent, connected across its output and then loaded in the usual manner. A toggle switch is used in place of the trigger arm (see fig. 5-2) and should be mounted along side the microswitch to operate the transmitting equipment.

b. Throw the switch on Relay Unit RE-21/ARW-10 to the "TUNE" position and allow about three minutes for warm-up time. The "NEUTRAL" light should go on as soon as the relay unit is turned on.

c. Throw the "LOW POWER-NORMAL" switch on Radio Modulator and Transmitter BC-1158 to the "LOW POWER" position and keep it there throughout the test.

WARNING

If the "LOW POWER" toggle switch is wired in position, make sure this wire is removed as soon as the transmitting equipment is no longer used as test equipment. Failure to do this will result in improper operation of the transmitter in a standard installation.

d. Connect Plug PL-55 to the milliammeter by means of two wires and insert the plug into the meter connection on Radio Receiver R-74/CRW-2. (See figs.1-2 and 2-2.)

e. Throw the microswitch on the transmitting equipment. The "READY" lights of RE-21/ARW-10 (part of Radio Set AN/ARW-10) will go on and the meter should read 3 to 5 milliamperes.

f. If 3 to 5 milliamperes is not obtained, it will be necessary to retune the receiver.

(1) Adjust the detector adjustment (see fig. 1-2) until the meter reads maximum.

(2) Adjust the r-f adjustments (see fig. 1-2) until the meter again reads maximum. If this reading is not between 3 and 5 milliamperes a new receiver will be required and the old receiver will need to be serviced according to the instructions in the *Handbook of Maintenance Instructions for Radio Set AN/ARW-10.*

g. Throw the toggle switch (used instead of trigger arm) on the transmitting equipment with the microswitch still on. All the lights on RE-21/ARW-10 should go out and the meter should read 3 to 5 milliamperes.

h. If 3 to 5 milliamperes is not still obtained, a new receiver will be required and the old receiver will need to be serviced according to the instructions in the *Handbook of Maintenance Instructions for Radio Set AN/ARW-10.*

i. After the above tests have been performed, Relay Unit RE-21/ARW-10 should be switched to the "OPERATE" position and Radio Set AN/ARW-10 should be checked for operation with its associated equipment. The associated equipment should begin to function when both the microswitch and toggle switch on the transmitting equipment are closed.

WARNING

It is imperative that all safety precautions be observed when the final operational check is made.

SECTION III
OPERATION

1. STARTING AND STOPPING EQUIPMENT.

a. TO START EQUIPMENT.—To operate Radio Set AN/ARW-10, throw the switch on Relay Unit RE-21/ARW-10 to the "OPERATE" position. In order to do this the wing screw and bracket must first be loosened and then tightened in the new position. (See fig. 3-1.)

b. TO STOP EQUIPMENT.—To cease operation of the equipment loosen the bracket and wiring screw and throw the switch on Relay Unit RE-21/ARW-10 to the "OFF" position. Retighten bracket and wing screw in the "TUNE" position.

2. OPERATION.

The Communications Officer will give instructions for the use and operation of this equipment.

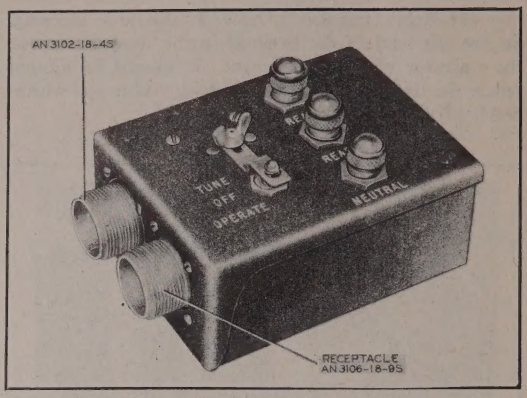


Figure 3-1. Relay Unit RE-21/ARW-10—Outside View

SECTION IV
EMERGENCY OPERATION AND REPAIR

1. EMERGENCY OPERATION.

There are no emergency operations possible with this equipment.

2. PILOT LAMP REPLACEMENT.

There are three pilot lamps on Relay Unit RE-21/ARW-10. (See fig. 3-1.) The two "READY" lamps are connected in parallel so that if one doesn't light, it still indicates that the system is still working.

a. To remove lamp, unscrew the knurled end of the lens assembly to the left to release and remove.

b. To replace lamp, reverse the procedure in Section IV, paragraph 2 *a.*

SECTION V
SUPPLEMENTARY DATA

1. COLOR CODE.

The color-code system used with Radio Set AN/ARW-10 is as follows:

a. END COLORS FOR FREQUENCY BAND.

Both End Colors	TN-43/CRW-2	*Detector Unit*
Orange	*R-F Unit*	TN-44/CRW-2

b. CENTER COLOR FOR TUNED FREQUENCIES.

Color	*Frequency*
Black	Lowest frequency in the band
Brown	Second frequency in the band
Red	Third frequency in the band
Orange	Fourth frequency in the band
Yellow	Highest frequency in the band

2. TUBE COMPLEMENT.

Reference Symbol	*Stock No.*	*Type Designation*		*Function*	*Location of Spares*
		JAN	*VT-*		
V-101	2J6SG7GT	JAN-6SG7GT	VT-211	Buffer	
V-102	2J6J5	JAN-6J5	VT-94	Detector	
V-103	2J6SL7GT	JAN-6SL7GT	VT-229	Audio amplifier and quench oscillator	
V-104	2J6SL7GT	JAN-6SL7GT	VT-229	Two tuned amplifier stages	
V-105	2J6SL7GT	JAN-6SL7GT	VT-229	Diode rectifier	
V-106	2J6SN7GT	JAN-6SN7GT	VT-231	Relay tube	

3. PILOT LAMP COMPLEMENT.

Type Designation	*Stock Number*	*Location*
LM-49	2Z5949	Relay Unit RE-21/ARW-10

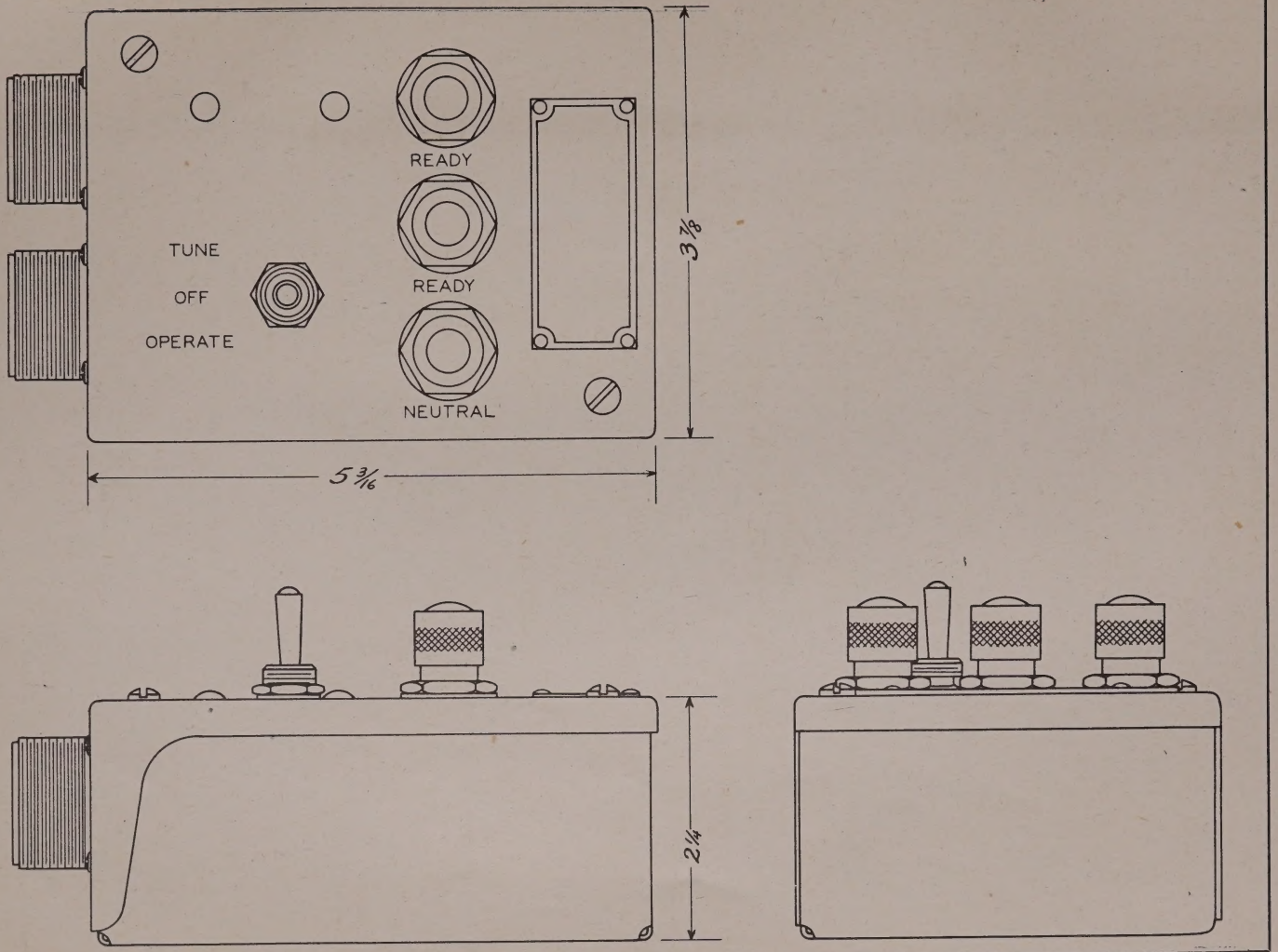


Figure 5-1. Relay Unit RE-21/ARW-10—Dimensional Diagram

WIRE TABLE

All wire to be Aircraft Cable per Spec. AN-J-C-48. Unless otherwise specified.

+Indicates individually shielded wires per Spec. 95-27273.

⊕Indicates wires whose voltage drop must not exceed limits of Spec. 95-32310.

Ref. Note	*Wire No.*	*Maximum Operating Voltage*	*Max. Allowable Resistance In Ohms (71°C)*	*Minimum Cable Size Permitted*
	2030			AN-20
	2031			AN-20
	2032			AN-20
	2033			AN-20
	2034			AN-20
	2035			AN-20
	2036			AN-20
	2037			AN-18
	2038			AN-18
	2039			AN-18
	2040			AN-18
+	2041			AN-20
	2042			AN-18

1. ALL TERMINAL STRIPS REQUIRED IN THE INSTALLATION OF THE WIRING SHALL BE MADE OF SUITABLE INSULATING MATERIAL AND WITH TERMINAL SPACING TO PROVIDE AGAINST VOLTAGE BREAKDOWN.

2. PLUG TYPE #M-118-A AS MADE BY CINCH MANUFACTURING COMPANY, CHICAGO, ILLINOIS, OR EQUAL.

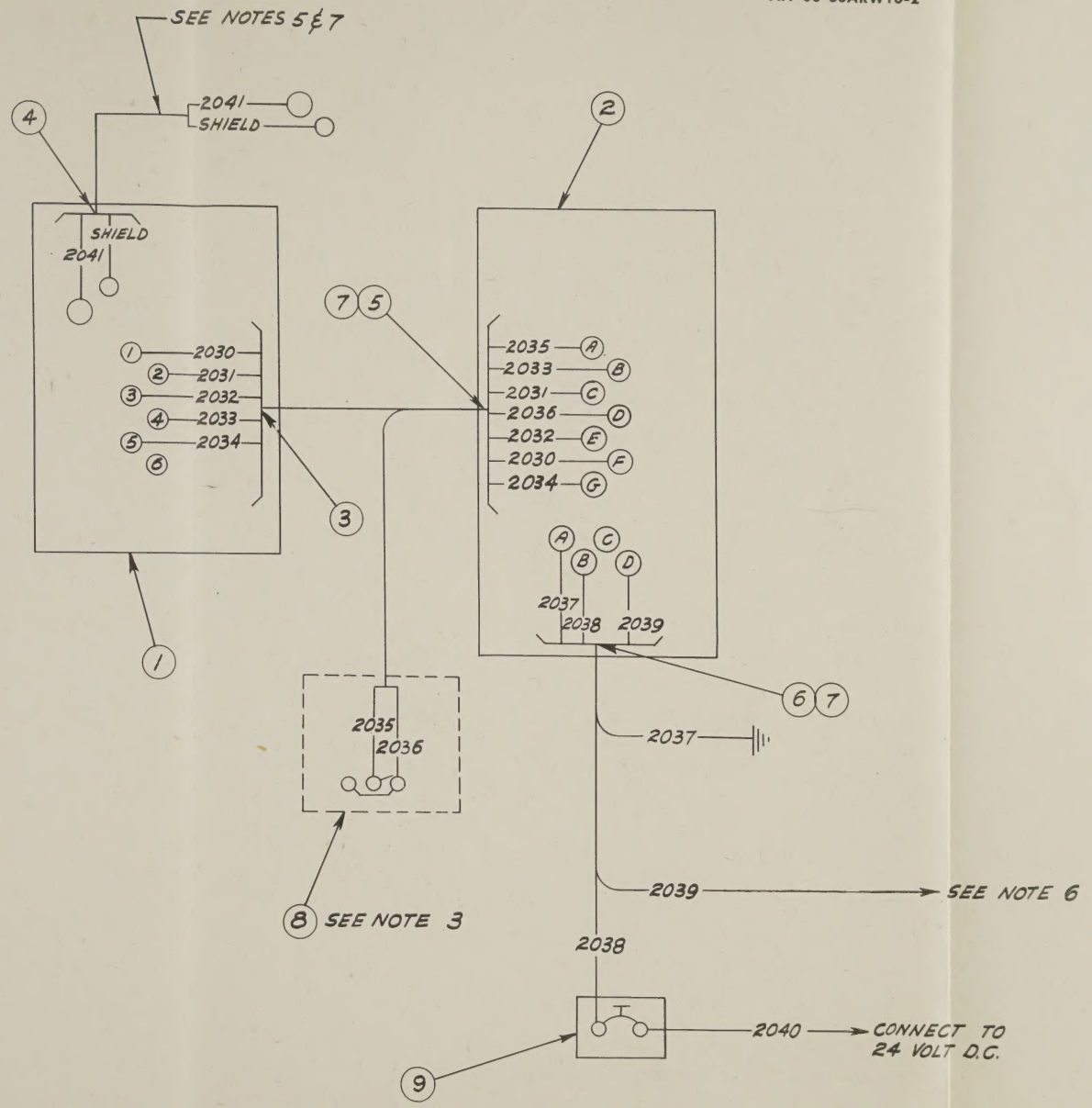
3. ALREADY INSTALLED IN AIRPLANE.

4. AS MADE BY HOWARD B. JONES CO., CHICAGO, ILLINOIS, OR EQUAL.

5. WIRE NOT TO EXCEED 6 FEET IN LENGTH.

6. CONNECT WIRE #2042 TO THE TERMINAL OF THE INTERNAL RACK SELECTOR SWITCH WHICH IS POWERED WHEN THE INTERNAL RACK SELECTOR SWITCH IS IN THE "OPEN" POSITION AND THE SAFETY SWITCH IS IN THE CLOSED POSITION.

7. CONNECT WIRE 2041 FROM LARGE PIN ON PLUG (4) TO THE ANTENNA AN-104-A OR B AND THE SHIELD FROM THE SMALL PIN TO THE ANTENNA GROUND.



COMPONENT TABLE

Item No.	*Quan. Prod.*	*Equipment Nomenclature*		*Spec. Or Installation Drawing*
		Description	*Type No.*	
*1	1	Radio Receiver	R-741/CRW-2	
*2	1	Relay Unit	RE-21/ARW-10	
*3	1	Plug (Jones)	Jones Plug S-306-CCT	(See Note 4)
*4	1	Plug	(See Note 2)	
*5	1	Plug	AN3106-18-9S	
*6	1	Plug	AN3106-18-4S	
*7	2	Adapter	AN3057-10	AN 3007
8	1	Switch		

*Indicates Government furnished equipment.

Figure 5-2. Radio Set AN/ARW-10—Cording Diagram